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His relinquishment of active professional work was probably due to a consciousness of failing vigor, but the gravity of his condition was not manifest until December 26, 1896, when he was stricken with unconsciousness while engaged in playing a game of cards with some friends at the Columbia Club. Although he partially rallied from the attack and was able to attend the Nansen meeting in the rooms of the American Philosophical Society, his work was done and the interval was one of patient waiting for the end. Among his few relaxations during his later years, had been those enjoyed as a member of a fishing club which occupied a comfortable house at Beesley's Point, N. J. He took an active part in the management of the establishment, and the last months of his life were spent there, until a renewed attack of cerebral hemorrhage terminated in death, November 24th of the present year.

The loss sustained by the Academy in the death of Drs. Horn and Allen is the most recent of a disastrous series beginning in 1891 with that of Dr. Joseph Leidy, and immediately preceded early in the present year by that of the brilliant naturalist, Edward D. Cope. The effect of such subtraction from the membership of the society must be acutely felt, but the work of these distinguished men lives after them, and we may be consoled by the hope that the influences which formed them, and which in no small measure emanated from this Academy, may continue to produce worthy successors who will be sustained and encouraged by the unselfish devotion to the cause of intellectual advancement of those who have gone before.

DR. ALLEN'S ZOOLOGICAL WORK.

BY SAMUEL N. RHOADS.

So far as we have any record, Dr. Harrison Allen's first and last papers on zoological subjects, as well as his last verbal communication before a scientific body, were originally presented in this Academy. Of seventy contributions to science, accessible to the author, fully one-half were first issued in the publications of this society.

In systematic zoological work Dr. Allen's publications number about thirty; in comparative anatomy, forty; those exclusively relating to Man number seven, while eight relate largely to the special subject of animal locomotion. With the exception of about ten of the seventy titles attributed to him, his papers are in the

nature of brief contributions to four of the more important American scientific journals and cover from one to four pages each. In many cases they were simply elaborations of verbal announcements first made at the meetings of this Academy. His monographic work comes under four titles, and it is worthy of special note that of the seventy titles appearing under his name, thirty-five relate almost exclusively to the Chiroptera or bats.

Dr. Allen's systematic work was confined wholly to the bats, a fact the more remarkable in view of his wide knowledge of and interest in many other families of the Mammalia. It is significant of his very early interest in this difficult and neglected group of animals, that his first published paper was printed in the *Proceedings* of the Academy in 1861 under the title, *Descriptions of New Pteropine Bats from Africa*. He here describes a new genus and three new species of African bats in the collections made by Du Chaillu and presented by subscription to the Academy. As a first effort this paper is surprisingly well prepared, both from the systematic and the anatomical points of view. Even granting his anatomical knowledge as a graduate of medicine, it is difficult to believe that the author had not made a close study of the bats previous to inspecting the Du Chaillu novelties. The theory that his interest in the Du Chaillu collections, coupled with the opportunity of entering upon a comparatively unworked field of original research, was the incentive of his life-long devotion to study of the Chiroptera, is probably correct.

Only three short papers by him, all on the Chiroptera, appeared between 1861 and 1864, during his service in the United States Army. It was in Washington while thus engaged that he came under the inspiring influence of Prof. S. F. Baird, to which was probably due the issue, in 1864, of his first *Monograph of the Bats of North America*.

Professor Baird having wholly omitted the Chiroptera from his great work on North American mammals, published by the Government in 1857, Dr. Allen was now able to supply a long felt need in the zoological literature of America. Confined as it was to a technical treatment of the species found north of Mexico, the monograph was limited to eighty-five pages of a volume of the *Smithsonian Miscellaneous Collections*. Of the twenty species and eight genera recognized, one genus and six species were first described by the author.

In forming an estimate of this work it would be unfair to test it by later standards. We must allow much for the crude conceptions and scant knowledge of American bats then existing among the most distinguished naturalists. The number of specimens then available for study in our museums was but a tithe of those now existing, and in the light of such facts Dr. Allen's initial work, performed during his leisure hours, does him credit as the pioneer in this branch of mammalogy.

In 1893 his second *Monograph of the North American Bats* appeared as *Bulletin No. 43* of the National Museum. This issue, more than twice the size of its predecessor, is based on more extensive suites of specimens than the first and summarizes the investigations of himself and others, including Dobson, during the intervening thirty years. The book is well illustrated, new methods of anatomical comparison are introduced and the morphology in many cases is greatly elaborated. The results, from the standpoint of the systematist, are somewhat confusing, and it is evident that the author was at times led astray by a wrong conception of the laws of geographic variation and unduly biased by his theory of pedomorphism. His effort to set his nomenclature on an enduring basis is only partially successful, handicapped as he was by his association with old-school systematists and the small amount of leisure which active office practice allowed him for an exhaustive examination of the literature. As a compendium of our knowledge of North American bats up to that period, in some cases half-concealing yet half-revealing the truths which have recently been elaborated by Mr. G. Miller, Jr. in his *Revision of the North American Vespertilionidae*,¹ Dr. Allen's last edition is a valuable and enduring work, full of original suggestion. It is the standard by which we must judge all future systematic work on the American Chiroptera. It is to be regretted that Mr. Miller should have neglected to do honor, in his *Revision*, to Dr. Allen's long and faithful service in this special department of zoology. The success of the later naturalist in his monographic work has only been made possible by the years of patient research, the mistakes, the suggestions, and withal the earnest truth-seeking, of Dr. Harrison Allen.

In comparative anatomy Dr. Allen published about forty papers, most of which are in the form of communications to learned societies on the anatomy of Man and the bats, and among these may be

¹ North Amer. Fauna, No. 13, 1897.

classed those relating to animal locomotion. In 1869 appeared his *Outlines of Comparative Anatomy and Medical Zoology*, a compend of his lectures delivered in the University of Pennsylvania as Professor of the branches treated of. The concise character of this little book, its simplicity of classification and treatment, and its suggestiveness to the student in original research, distinguish it from ordinary text books, and it may still serve as a valuable guide to instructors in anatomy.

Notes on the *Conformation of the Mammalian Skull and Studies in the Facial Region*, also record observations indicating the special studies which Dr. Allen had been conducting previous to the year 1875 and which were bringing him into prominence as an anatomist.

In his studies of animal locomotion Dr. Allen deserves special notice, standing as he does quite alone in his discussion of Prof. Muybridge's instantaneous photography of animals in motion. This work was performed at the request of the University of Pennsylvania. He had previously studied anatomically the limbs of the mammalia, notably the wings of bats, with a similiar purpose in view. His paper was modestly entitled *Materials for a Memoir on Animal Locomotion*. On this unpretentious basis the whole essay is largely conducted, no theories or generalizations being indulged in where a more imaginative writer would have felt at liberty to roam at will. He confined his speculations on animal locomotion, as in his previous work, chiefly to practical suggestions for future investigation.

In connection with this work we find several examples of newly-coined words and technical terms called for by Dr. Allen's studies in minute anatomy. Without such additions to nomenclature a new branch of technical study such as the one undertaken by Muybridge and Allen could not be intelligently, and at the same time concisely, presented.

In 1884 Dr. Allen published his *System of Human Anatomy*, a quarto volume of eight hundred pages, profusely illustrated, and representing an amount of learning and labor far out of proportion to its popularity and financial success.

His *Distribution of Color Marks in the Mammalia* which appeared in the *Proceedings* of the Academy in 1888, is the most important contribution to the literature of the subject yet published by an American author. He states his "main object has been to contemplate color marks as the result of nutritive processes, controlled by recognized biological forces both in health and disease." The paper is a

valuable record of observations made on the lines defined by previous writers, especially by Eschricht and Voigt, on the human subject. It forms a valuable summary of previous work, adding much material for future research, but advancing no hypotheses. In this the author was consistent with the cautious conservatism which characterized his life.

Taking a comprehensive view of the zoological work of Dr. Allen in connection with our knowledge of his personality, we are most impressed with its conscientiousness united to an unselfishness only too rare among men of Science.

In a personal acquaintance with Dr. Allen as a student of zoology, the author was early impressed with his serious and deliberate, almost solemn, consideration of the subject in hand. A more intimate acquaintance revealed his geniality and humor and his philosophic interest in created things.

He never reached conclusions hastily even on subjects of minor import. His faculty, may it not be said his genius, for tentative suggestion as to the significance of phenomena was exercised in such a conservative way that it could neither mislead nor be misconstrued as a declaration of belief. His sincerity of purpose, his humility, and his love of nature endeared him to his associates and emphasize their regret for his loss.

DR. ALLEN'S CONTRIBUTIONS TO ANTHROPOLOGY.

BY DANIEL G. BRINTON, M. D.

The field of science, strictly so-called, which Dr. Allen cultivated, was that of anatomy, and primarily human anatomy.

He understood this science, however, in a very different sense from that in which it is usually presented in medical schools. He was not at all in sympathy with the programme which reduces anatomy to the position of a handmaid to clinical surgery. Such a method he considered not only unworthy the true relations of anatomical study, but ultimately an injury to practical medicine itself; because etiology is the only sure guide to rational practice; and etiology means nothing so much as the investigation of progressive tissue-change, in other words, histological and gross anatomy.

It was in this spirit that he applied his profound and minute knowledge of human and comparative anatomy to medical and surgical questions, and with the same broad grasp he attacked the problems